**Name:**

**Date:**

**Block:**

**Addiction**

**Addiction: What Is It?**

Addiction is not just a lot of drug use. It is actually a different state of being. In addiction, drugs hijack your brain, your mind, and your life. They literally change your brain — that is why we call addiction a brain disease. Once people become addicted, their focus in life becomes seeking and using drugs. They no longer seem to care about any of the consequences that may result from taking drugs. This is very different from a person who is a drug user or abuser. A drug abuser can choose whether or not to use a drug.

Drug addiction is a compulsion. When people become addicted to drugs, their brains have fundamentally changed. Addiction is compulsive drug seeking and use, even in the face of appalling consequences.

**How Drugs Work on the Brain**

Certain drugs make us feel very good — at least at first — because of what they do to our brains. Drugs that are abused change the way our brains work by disrupting the delicate mechanisms through which nerve cells transmit, receive, and process information critical for our daily living. Nicotine, cocaine, marijuana, and heroin, for example, are rapidly carried to the brain through our bloodstream regardless of whether they are smoked, injected, or swallowed. Then they stimulate different circuits in our brain, one of which is called the pleasure center. Continued abuse of drugs, which unnaturally overstimulates brain circuits, can change the brain to an addicted state. The affected circuits can no longer function on their own, but need outside stimulation to function. The drug addict has very little choice as to whether to take the drug or not.

**The Pleasure principle**

The brain registers all pleasures in the same way, whether they originate with a psychoactive drug, a monetary reward, a sexual encounter, or a satisfying meal. In the brain, pleasure has a distinct signature: the release of the neurotransmitter dopamine. Dopamine release is so consistently tied with pleasure that neuroscientists refer to the region as the brain’s pleasure center.

All drugs of abuse, from nicotine to heroin, cause a particularly powerful surge of dopamine. The likelihood that the use of a drug or participation in a rewarding activity will lead to addiction is directly linked to the speed with which it promotes dopamine release, the intensity of that release, and the reliability of that release.

Even taking the same drug through different methods of administration can influence how likely it is to lead to addiction. Smoking a drug or injecting it intravenously, as opposed to swallowing it as a pill, for example, generally produces a faster, stronger dopamine signal and is more likely to lead to drug misuse

**The Rat Experiments**

In one experiment, an electrical current was given to rats if they entered a certain corner of a cage, with the hypothesis that they would stay away from that corner if the effect was uncomfortable. Instead, they came back quickly after the first stimulation and even more quickly after the second. In later experiments, they allowed the rats to press the stimulation lever themselves, to the effect that they would press it as much as seven-hundred times per hour.

Rats in boxes with metal electrodes implanted into their pleasure centers will repeatedly press a lever which activates this region, and will do so in preference over food and water, eventually dying from exhaustion. If a rat is given the choice between stimulation or eating, it will choose stimulation to the point of death.

**Discussion Questions:**

1. Given what you have learned about addiction and the brain. Why do you think that some people are genetically more likely to become addicted than others?
2. Why did the rats continue to press the lever up until death? What is going on? Why didn’t they eat?
3. Why do you think that the pleasure center naturally exists in the human brain? What purpose might it serve?
4. Since addiction “rewires” the brain, how do you think that one repairs the connections? Do you think that a recovered addict’s brain goes back to the same “wiring” as before the addiction?